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Simulating Production Optimization by Water Injection in a Homogenous Reservoir

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Abstract—Water flooding is a significant technology applied in oil reservoirs afterwards primary production, but the real recovery mechanisms are still poorly unstated. Because of adverse mobility ratio effects between oil and water, injected water will tend to finger through the oil bank, leaving large portions of the reservoir upswept. Breakthrough of water will occur early in the life of a water flood, followed by further oil production at high water cuts. Viscous variability theory can be used to describe the oil recovered up to breakthrough, but the mechanisms leading to oil recovery at later times have been largely unexplored. The model applied is based on the comparative study that introduces production of oil before and after the water flooding strategy, along with sensitivity analysis using varied parameters. This research study reveals the effect of perforation and well location as primary factors in the development of an oil field. In this study, the results obtained from reservoir simulation for various oil production scenarios are summarized. Result shows that waterflooding could be operative if water breakthrough is behind. However, reservoir heterogeneity would introduce geological uncertainty, which could bring mismatch between the simulated case and a real case. This study concluded that the determination of various parameters that affects the oil well productivity. The simulation is initialized in an oil producing reservoir and placed in different scenarios which including primary recovery, water flooding, well's location.

Keywords—Production Optimization, Water Injection, Secondary Recovery, Reservoir Simulation